Appendix C. Details of Taxa-Specific Study Plans.

SECTION I: BIRDS

A. PROJECT TITLE: Bird Data Review for National Capital Network Parks

PROBLEM STATEMENT:

NPSpecies does not currently reflect the complete set of available data documenting bird occurrences in the parks of the National Capital Network (NCN). Additional data, including museum vouchers, observations from local birding clubs, and publications, reports, photo and specimen vouchers in NCN parks, will be reviewed and added to NPSpecies for each park. Based on subject expert review, we expect that CHOH, GWMP, and ROCR inventories will be completed (90% completion or greater) by reviewing and adding observations from local birding clubs and other sources into NPSpecies.

OBJECTIVES:

1. Collect and review existing bird data from NCN parks, local natural history museums, and local birding groups to complete population of NPSpecies.

STUDY DESIGN AND METHODS:

We will contact partnering agencies and obtain data for each park. Data will be reviewed for quality and entered into NPSpecies. Based upon subject expert review (Deanna Dawson, USGS-BRD, Patuxent), the following data is available:

CATO – Christmas Bird Count data available.

CHOH – Observational records and data from a 2000 Winter Bird Survey need to be reviewed for waterbirds including ducks and shorebirds. New data will be entered into NPSpecies.

GWMP – Observational records from Friends of Dyke Marsh, D.C. Audubon, Fairfax Audubon Society, Northern Virginia Bird Club, and Audubon Naturalists Society need to be reviewed for migrating waterfowl, shorebirds, and passerines. New data will be entered into NPSpecies.

MANA – Christmas Bird Count data available.

ROCR – Observational records from Breeding Bird Surveys, D.C. Birdscape, and researchers from USFWS and the Smithsonian Institution need to be reviewed for common and migrating species. New data will be entered into NPSpecies.

All Parks – Observational records from partnering organizations and individuals, voucher specimens at local museums (Frostburg State University, Maryland; George Mason University, Fairfax; Georgetown

University, Washington DC; University of Virginia, Charlottesville; Virginia Polytechnic Institute and State University, Blacksburg) and NCN Parks will be reviewed and entered into NPSpecies to complete existing inventory documentation.

All observational records will be reviewed for accuracy. After all existing data is entered, we will re-evaluate NPSpecies bird records and re-assess percent completion. If additional surveys are needed they will be included in FY 2002 surveys as outlined in the General Bird Inventories for National Capital Network Parks (see below).

PARTNERSHIPS:

Fairfax Audubon Society, Audubon Naturalists Society, Northern Virginia Bird Club, Friends of Dyke Marsh, Virginia Ornithological Society, Maryland Ornithological Society, Christmas Bird Count compilers, Smithsonian Institution.

IMPLEMENTATION:

The Biological Inventories Coordinator will contact and visit museums, local birding clubs and societies, and Network parks to obtain this information.

SCHEDULE:

FY 2001:

October–September Obtain data and review for quality, enter new data into NPSpecies

PRODUCTS:

A final report summarizing data compilation efforts will be prepared. The Biological Inventories Coordinator will ensure that the project findings are entered into the appropriate I&M databases, including NPSpecies, NRBib, ANCS+, and the Dataset Catalog. The National Capital Network's Inventory & Monitoring Steering Committee and the Natural Resources Advisory Team (NAT) will be updated bimonthly. Summary reports will be published in regional ornithological journals (e.g. The Raven).

FUNDING:

Budget Item	FY 2001	FY 2002	FY 2003	FY 2004
Transportation				
500 vehicle mi. @ $0.325/mi	163			
Photocopying	57			

Totals	220

B. PROJECT TITLE: General Bird Inventories for National Capital Network Parks

PROBLEM STATEMENT:

Of the five taxonomic groups covered in this project, the National Capital Network has the most complete data on birds. NACE has a nearly complete inventory, and our subject expert reviewer (Deanna Dawson, USGS-BRD, Patuxent) identified existing data available to complete bird lists for CHOH, GWMP, and ROCR (refer to Section I-A for details). In addition, MONO has a full bird inventory in progress. All other parks (ANTI, CATO, HAFE, MANA, PRWI, and WOTR) will be inventoried. High priority parks (ANTI and WOTR) require year-round surveys to document breeding, migrating, and wintering bird species. Medium Priority Parks (CATO, HAFE, MANA, and PRWI) already have extensive data and only require seasonal surveys to document 90% of the expected bird species (Appendix B).

OBJECTIVES:

1. Coordinate volunteers to fill data gaps of breeding, wintering, and migrating bird species occurrences at ANTI, CATO, HAFE, MANA, PRWI, and WOTR.

2. Identify breeding status of newly-documented bird species.

3. Document occurrence of species of special concern (study plan, Table 6).

STUDY DESIGN AND METHODS:

The purpose of this study is to document the presence of 90% of expected bird species in each park. Accordingly, inventories will be made using an extensive volunteer network of expert birders in the D.C. Metro area during FY 2001 and 2002 (Fancy and Sauer 2000). Volunteers will be selected based on their observational skills and birding experience and assigned to collect data at one or more parks. Training and support will be provided by the Biological Inventories Coordinator during the two years of the inventories. Seasonal field visits will be made with volunteers to ensure quality control.

To facilitate development of GIS based maps and to encourage adequate sampling coverage, we will develop a grid based sampling framework. Volunteers will be asked to keep species lists for each grid and to document occurrence and status (eg migrating, resident, or breeding) using standard methodologies (e.g. Breeding Bird Atlas methodology - American Birding Association 2000). Special efforts should be made to visit rare or unique habitats and habitats of special concern and to document species of special concern. Bird species of special concern for the National Capital Network (NCN) include those listed as endangered or threatened by state or federal agencies, species listed as a priority by the Mid-Atlantic Piedmont and Mid-Atlantic Coastal Plain Bird Conservation Plans developed by Partners in Flight (PIF 2000a, PIF 2000b), or species identified by a park because of their rarity or their likelihood of being used in vital signs monitoring.

General habitats to be surveyed for species of special concern include:

Deciduous and Mixed Forest: Acadian Flycatcher, Wood Thrush, Veery, Cerulean Warbler, Kentucky Warbler, Hooded Warbler, Prothonotary Warbler, Yellow-throated Warbler, Worm-eating Warbler, Louisiana Waterthrush, Scarlet Tanager.

Shrub-scrub/barrens: Northern Bobwhite, American Woodcock, Whip-poor-will, Loggerhead Shrike, Prairie Warbler, Golden-winged Warbler, Field Sparrow.

Agricultural grasslands: Henslow's Sparrow, Grasshopper Sparrow

Wetlands: American Bittern, Least Bittern, American Black Duck

Cliffs: Peregrine Falcon

Use of tape recorders may be used to inventory species of special concern, nocturnal, rare, or secretive species.

Volunteers will receive lists of expected species for their assigned park, a list of species of special concern, data sheets, maps with a grid overlay, habitat information, and complete inventory instructions to document species in their assigned area (see Appendix D). Inventories will occur year-round for High Priority parks and as needed for Medium Priority parks. Completed datasheets will be returned to the NCR - I&M office at the end of each month, checked for quality, and added into the appropriate I&M databases. Due to the importance of species of special concern, an observation of nesting evidence should be verified by the Biological Inventories Coordinator or another qualified individual.

High Priority Parks

ANTI – Inventories of breeding birds (especially those that nest in early successional and forested habitats) will be conducted. Winter bird use of agricultural fields, grasslands, and ponds are poorly documented and will be targeted for further sampling. Migrating species, especially waterfowl and shorebirds, will be documented.

WOTR – Systematic surveys during all seasons will be conducted in this park, as no previous work has been done at WOTR.

Medium Priority Parks

HAFE – Migrating species have been inadequately documented in the park and will be targeted as part of this project. Special searches will also be conducted in Maryland Heights to document presence and potential nesting of Common Ravens.

MANA – Nesting nocturnal species and grassland species will be sampled. Migrating species including passerines, waterfowl, and shorebirds require further documentation and will receive further study.

PRWI – Impoundments will be inventoried for migrating and wintering waterfowl. Special searches will be made for migrating and wintering passerines in forest and scrub habitats; most have been documented but several expected species require verification.

Inventories will continue until at least 90% of expected species have been documented. In addition, the programs CAPTURE and SPECRICH, available at http://www.mbr-pwrc.usgs.gov/software.html, will be used to estimate the probability of documenting additional species based on catch per unit effort and other measures if adequate sample sizes have been reached. Species richness estimates will allow for comparisons among habitat types, strata, and parks. Distribution maps will be generated as needed.

PARTNERSHIPS:

Fairfax Audubon Society, Audubon Naturalists Society, Northern Virginia Bird Club, Friends of Dyke Marsh, Virginia Ornithological Society, Maryland Ornithological Society, Christmas Bird Count compilers, Smithsonian Institution. ROCR received funding in FY 00 from the Small Parks Initiative (SPIN) to conduct surveys of raptors and to document their breeding success.

IMPLEMENTATION:

The Biological Inventories Coordinator will coordinate this work with local birding clubs and organizations.

SCHEDULE:

FY 2001:

November-December	Develop maps, training documents, and data sheets for field work; develop grid system in each park; contact local birding groups and identify volunteers for each park
January-March	Field work to document wintering species
April-July	Field work to document migrant and early breeding species
May-July	Field work to document breeding birds
August-September	Field work to document fall migrants
September	Data analysis, 90% completion analyses, annual report preparation

FY 2002:

December	Survey for wintering species
April-July	Field work to document migrant and early breeding species
May-July	Field work to document breeding birds
August-September	Field work to document fall migrants
September	Data analysis, 90% completion analyses, annual report preparation

FY 2003:

December	Survey for wintering species
January-March	Data analysis, 90% completion analyses, final report preparation

PRODUCTS:

A list of bird species documented in each park including species of special concern. A comparison will be made between the expected species (Appendix B) and documented species in each park. Annual reports, final reports, MS Access or Excel databases of all information collected during the project, and ArcView themes of project data will be developed. Metadata in accordance with FGDC and USGS NBII standards will be developed. The Biological Inventories Coordinator will ensure that the project findings are entered into the appropriate I&M databases, including NPSpecies, NRBib, ANCS+, and the Dataset Catalog. The National Capital Network's Inventory & Monitoring Steering Committee and the Natural Resources Advisory Team (NAT) will be updated bimonthly. Summary reports will be published through regional ornithological journals (e.g. The Raven).

FUNDING:

Budget Item	FY 2001	FY 2002	FY 2003	FY 2004
Equipment	500	500		
High Priority Parks Transportation (1 visit per mo./park). 1,680 vehicle miles @ $0.325/mile	546	546		
Medium Priority Transportation (1 visit per 2 mo./park). 2,520 vehicle miles @ $0.325/mile	819	819		
Totals	**1,565**	**1,565**		

LITERATURE CITED:

American Birding Association. 2000. Breeding Bird Atlasing. http://americanbirding.org/programs/consatlas.htm. Available Online: Sept. 2000.

Fancy, S. and J. Sauer. 2000. Recommended methods for inventorying and monitoring landbirds in National Parks. Version 5 May 2000. National Park Service. Unpublished Report.

Partners In Flight. 2000a. ***Mid-Atlantic Coastal Plain*** - Bird Conservation Plan – Executive Summary. http://www.blm.gov/wildlife/pifplans.htm.

Partners In Flight. 2000b. ***Mid-Atlantic Piedmont*** - Bird Conservation Plan – Executive Summary. http://www.blm.gov/wildlife/pifplans.htm.

SECTION II: FISH

PROJECT TITLE: General Fish Inventories for National Capital Network Parks

PROBLEM STATEMENT:

Five of 11 parks have documented 90% of the expected fish species. The remaining six parks (ANTI, CHOH, GWMP, HAFE, MONO, and WOTR) will be surveyed for fishes as part of this project. General surveys will be conducted in order to document 90% of the expected fish species (Appendix B) in each of the six parks. Currently, there are no fish species of special concern in the Network's national parks.

OBJECTIVES:

1. To complete population and verification of NPSpecies records for NCN fish.

2. To complete searches of local natural history museums for fish records in NCN parks.

3. To conduct field surveys for fish at ANTI, CHOH, GWMP, HAFE, MONO, and WOTR to bring the number of documented species up to at least 90% of the expected species in each park (Appendix B).

STUDY DESIGN AND METHODS:

Inventory methods for fishes are described in detail in the study plan, Step 5, Survey Methods.

IMPLEMENTATION:

This project will be carried out through a cooperative agreement with a university, state or federal agency. A request for proposals will be sent out in FY 2002. Several ichthyologists at these institutions have already worked in some of our parks (Dr. Richard L. Raesly – Frostburg State University, Dr. Jay R. Stauffer – Penn State University, etc.), and would be excellent candidates to lead the study. We will coordinate and assist with the ichthyologist's field work to ensure that the needs of the program are being met.

SCHEDULE:

FY 2001:
Conduct searches of local museums for fish records in the region; edit and complete NPSpecies documentation for completed inventories in the parks; compile relevant GIS data layers (locations of streams and other water bodies) for each park to be surveyed; digitize all blue-line streams in each park from a 1:250,000-scale U.S. Geological Survey topographic map; determine Strahler order (Strahler 1957) for each stream segment

FY 2002:

October-November	Prepare and submit a request for proposals for the fish inventories
November-December	Review submitted proposals, meet with potential principal investigators, and prepare cooperative agreement(s)
January-May	Hold meetings at each park to be surveyed including the principal investigators, park natural resource managers, and I&M staff, discuss sampling sites
May-October	Conduct fish surveys at half of the parks with needed fish inventories
October-December	Data analysis, 90% completion analyses, annual report preparation

FY 2003:

January-May	Hold meetings at each park to be surveyed including the principal investigators, park natural resource managers, and I&M staff, discuss sampling sites
May-October	Conduct fish surveys at second half of the parks with needed fish inventories
October-December	Data analysis, 90% completion analyses, annual report preparation

FY 2004:

Final report preparation and review; 90% completion analyses, follow-up field work needed to complete any remaining gaps

PRODUCTS:

A list of fish species documented in each park. A comparison will be made between the expected species (Appendix B) and documented species in each park. The principal investigator will provide annual reports, a final report, MS Access or Excel databases of all information collected during the project, and ArcView themes of project data. Metadata in accordance with FGDC and USGS NBII standards will be provided by the principal investigator. The Biological Inventories Coordinator will ensure that the project findings are entered into the appropriate I&M databases, including NPSpecies, NRBib, ANCS+, and the Dataset Catalog. The National Capital Network's Inventory & Monitoring Steering Committee and the Natural Resources Advisory Team (NAT) will be updated bimonthly.

FUNDING:

Budget Item	FY 2001	FY 2002	FY 2003	FY 2004
Cooperative Agreement		25,000	20,000	20,000
Totals		**25,000**	**20,000**	**20,000**

LITERATURE CITED:

Strahler, A.N. 1957. Quantitative analysis of watershed geomorphology. American Geophysical Union, Transactions 38:913-920.

SECTION III: MAMMALS

A. PROJECT TITLE: General Mammal Inventory for National Capital Network Parks

PROBLEM STATEMENT:

There is very little information on mammals in NCN parks. No park has reached 90% inventory completeness for mammals. Parks are particularly lacking in bat presence-absence information and many parks need small mammal inventories. In this project, we will inventory all (ANTI, CATO, CHOH, GWMP, HAFE, MANA, MONO, NACE, ROCR, and WOTR) NCN parks for mammals except PRWI. PRWI has 84% of expected mammal species documented. Most of the missing mammal species on PRWI's list are expected to be documented when complete museum searches are conducted and additional references are located. Several mammals have been identified as species of special concern in the Network's national parks because they are rare or are likely to be used in vital signs monitoring. Although the steering committee decided that general inventories should take priority over obtaining detailed distribution and abundance data for species of special concern, we will obtain limited distribution and abundance data for these species as part of this project. Detailed density information will be obtained for white-tailed deer (see following project description). Two species of special concern, white-tailed deer at HAFE and bobcat (*Lynx rufus*) at NACE will be sampled using other regional funds.

OBJECTIVES:

1. To complete population and verification of NPSpecies records for NCN mammals.

2. To complete searches of local natural history museums for mammal records in NCN parks.

3. To conduct field surveys for small mammals at ANTI, CATO, CHOH, GWMP, HAFE, NACE, ROCR, and WOTR to bring the number of documented species up to at least 90% of the expected species in each park (Appendix B).

4. To conduct field surveys for medium/large mammals at ANTI, CHOH, GWMP, HAFE, and ROCR to bring the number of documented species up to at least 90% of the expected species in each park (Appendix B).

5. To conduct field surveys for bats at ANTI, CATO, CHOH, GWMP, HAFE, MANA, MONO, NACE, ROCR and WOTR to bring the number of documented species up to at least 90% of the expected species in each park (Appendix B).

6. To obtain limited distribution and abundance data for mammal species of special concern (study plan, Table 6).

STUDY DESIGN AND METHODS:

Inventory methods for mammals are described in detail in the study plan, Step 5, Survey Methods.

PARTNERSHIPS:

MONO received funding in FY 00 from the Small Parks Initiative (SPIN) to conduct a small, medium, and large mammal survey in the park. The project will include estimates of relative abundance of selected species and development of management recommendations for Monocacy's mammals. GWMP also received SPIN funding in FY 00, and will conduct a bat survey in one section of the park, the South Parkway (Dyke Marsh south to Mt. Vernon).

IMPLEMENTATION:

The small and large mammal inventories will be carried out through a cooperative agreement with the Smithsonian Institution and Dr. William McShea. The bat inventories will be carried out through a cooperative agreement with a university, state or federal agency. A request for proposals will be sent out in FY 2003. Several mammalogists at these institutions have already worked in some of our parks (Richard Reynolds – Virginia Department of Game and Inland Fisheries, Dr. William McShea – Smithsonian Institution, etc.), and would be excellent candidates to lead the study. We will coordinate and assist with the mammologist's field work to ensure that the needs of the program are being met.

SCHEDULE:

FY 2001:

October-April	Hold meetings at each park to be surveyed including the principal investigators, park natural resource managers, and I&M staff, discuss sampling sites, conduct searches of local museums for mammal records in the region, edit and complete NPSpecies documentation for completed inventories in the park, compile relevant GIS data layers (locations of water bodies, roads, etc.) for each park to be surveyed
April-October	Conduct small/medium/large mammal surveys at half of the parks with needed inventories

FY 2002:

November-April	Data analysis, 90% completion analyses, annual report preparation, hold meetings at each park to be surveyed including the principal investigators, park natural resource managers, and I&M staff, discuss sampling sites
December	Conduct medium/large mammal surveys at half of the parks with needed inventories
April-October	Conduct small/medium/large mammal surveys at second half of the parks with needed inventories

FY 2003:

October-November	Prepare and submit a request for proposals for the bat inventories
November-December	Review submitted proposals, meet with potential principal investigators, and prepare cooperative agreement(s)
December	Conduct medium/large mammal surveys at second half of the parks with needed inventories
January-May	Hold meetings at each park to be surveyed including the principal investigators, park natural resource managers, and I&M staff, discuss sampling sites (bats); Data analysis, 90% completion analyses, annual report preparation (small/medium/large mammals)
May-September	Conduct bat surveys at half of the parks with needed bat inventories; final report preparation and review; 90% completion analyses, follow-up field work needed to complete any remaining gaps (small/medium/large mammals)

FY 2004:

October-December	Data analysis, 90% completion analyses, annual report preparation
January-May	Hold meetings at each park to be surveyed including the principal investigators, park natural resource managers, and I&M staff, discuss sampling sites
May-September	Conduct bat surveys at second half of the parks with needed bat inventories

FY 2005:

October-December	Data analysis, 90% completion analyses, annual report preparation, final report preparation and review

PRODUCTS:

A list of mammal species documented in each park. A comparison will be made between the expected species (Appendix B) and documented species in each park. The principal investigators will provide annual reports, final reports, MS Access or Excel databases of all information collected during the project, and ArcView themes of project data. Metadata in accordance with FGDC and USGS NBII standards will be provided by the principal investigators. The Biological Inventories Coordinator will ensure that the project findings are entered into the appropriate I&M databases, including NPSpecies, NRBib, ANCS+, and the Dataset Catalog. The National Capital Network's Inventory & Monitoring Steering Committee and the Natural Resources Advisory Team (NAT) will be updated bimonthly.

FUNDING:

Budget Item	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Cooperative Agreement - small/lrg. mammals	48,700				
Cooperative Agreement - bat inventories				26,000	30,000
Totals	**48,700**			**26,000**	**30,000**

B. PROJECT TITLE: Distance Sampling for Deer Density Estimation Using Spotlight Monitoring Data In National Capital Network Parks

PROBLEM STATEMENT:

White-tailed deer overabundance is a major management concern in National Capital Network parks. Deer overabundance results in poor seedling growth and forest regeneration, which has far-reaching impacts to other species in the park, including species of special concern. In May 1999, Catoctin Mountain Park convened a workshop with deer experts from the Smithsonian Conservation Research Center, the State University of New York, WASO, the University of Georgia, Gettysburg National Military Park resource manager, and NCN park resource managers to discuss deer abundance and sampling strategies. Participants critiqued past sampling methods and recommended the implementation of distance sampling to determine deer density information for the region. All parks in the network for which the distance sampling technique is applicable will be sampled. White-tailed deer at HAFE, which lacks the road network needed for the technique, will be sampled using other regional funds.

OBJECTIVES:

1. To estimate deer density and herd composition at ANTI, CATO, CHOH, GWMP, MANA, MONO, NACE, PRWI, and ROCR using distance sampling.

2. To develop recommendations for a full implementation of the distance sampling framework to complement other methods of deer population monitoring.

3. To conduct an on-site training session for the network on the technical details of the method and software for performing analyses.

4. To perform a statistical power analysis for detecting trends using these data and other available data sources.

STUDY DESIGN AND METHODS:

Interest in the use of Distance Sampling (Burnham et al. 1980, Buckland et al. 1993) for estimating white-tailed deer density and herd composition has increased dramatically in recent years. The interest is due, in part, to the extensive work conducted on Fire Island National Seashore (Underwood et al. 1998) where the method was explored in detail and tailored to park environments.

Deer group composition and size will be collected along road transects during morning and evening surveys (approximately 20 minutes prior to sunrise ad 20 minutes after sunset) by using spotlights. Location of transects depends on road availability and transects are not randomly assigned. Transect length will also depend upon available road systems and estimates of the standard error of deer density based on preliminary surveys in each park. Forty to sixty group detections are recommended for the model to perform well. Pooling of replicate samples will be permitted if road lengths are limited.

Preliminary surveys at Catoctin Mountain Park and Manassas Battlefield required only 1-2 surveys to reach adequate sample sizes. Parks will not be surveyed by this method if roadways permit coverage of <10% of the total park area (e.g. HAFE and WOTR).

Along with sex and age assignments, perpendicular distance (or radial distance and sighting angle) will be measured for each group. In addition, the location of the group or individual will be recorded using a real-time differential GPS. Deer density will be estimated using the program DISTANCE (Laake et al. 1998) and an analysis of statistical power for population trend detection may be performed for some parks as in Underwood et al. (1998). A 3-day training session on the distance sampling technique and how the data are analyzed will be designed and conducted that will allow individual parks to conduct similar analyses in subsequent years.

Despite its reliance on sampling from existing roads, distance sampling is the best available method for this region. Alternatives to distance sampling have been considered but are less suitable. Standard spotlight counts, for example, are less accurate because it can not be assumed all deer are counted within the estimated strip width. Establishment of deer pellet-group plots are time-consuming and less accurate because the local defecation rates are unknown. Mark-and-recapture methods require large amounts of time to capture deer. At least 25% of the population has to be marked for the method to be effective and unless there are ancillary studies involved (e.g. radiocollaring) it is an inefficient method to count deer. The use of aerial counts depends on snow cover, which is ephemeral in the mid-Atlantic region, and repeated counts are required for statistical precision, driving up costs. Infrared counts have been conducted in the past but are expensive ($1.50/acre) and the assumption of detecting all deer has been questioned.

PARTNERSHIPS:

Deer density estimates at CATO and the training session were funded by the National Capital Region.

IMPLEMENTATION:

The work will be carried out through a cooperative agreement with the State University of New York and Dr. H. Brian Underwood.

SCHEDULE:

FY 2001:

October	Conduct 3-day training session; survey CATO
October-March	Conduct deer surveys at remaining parks
March-September	Data analysis, prepare final report and recommendations for future park sampling

PRODUCTS:

Deer density estimates and herd composition for each park. Training materials, software for performing analyses, and a software manual will be provided to each park. The final report will include a statistical power analysis for detecting trends using these data and recommendations for full implementation of distance sampling in each park. The Biological Inventories Coordinator will ensure that the project findings are entered into the appropriate I&M databases, including NPSpecies, NRBib, ANCS+, and the Dataset Catalog. The National Capital Network's Inventory & Monitoring Steering Committee and the Natural Resources Advisory Team (NAT) will be updated bimonthly.

FUNDING:

Budget Item	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Cooperative Agreement	20,000				
Totals	**20,000**				

LITERATURE CITED:

Buckland, S.T., D.R. Anderson, K.P. Burnham, and J.L. Laake. 1993. Distance sampling: estimating abudance of biological populations. Chapman & Hall, London. 446 pp.

Burnham, K.P., D.R. Anderson, and J.L. Laake. 1980. Estimation of density from line transect sampling of biological populations. Wildlife Monographs Number 72. 202 pp.

Laake, J.L., S.T. Buckland, D.R. Anderson, and K.P. Burnham. 1993. DISTANCE User's Guide. Colorado Cooperative Fish and Wildlife Research Unit, Colorado State University, Fort Collins.

Underwood, H.B., F.D. Verret, and J.P. Fischer. 1998. Density and herd composition of white-tailed deer on Fire Island National Seashore. Final report to the National Park Service, Syracuse, New York.

SECTION IV: REPTILES AND AMPHIBIANS (HERPS)

PROJECT TITLE: General Reptile and Amphibian Inventories for National Capital Network Parks

PROBLEM STATEMENT:

There is very little information on the herpetofauna of the National Capital Network parks. Only two of 11 parks, NACE and PRWI, have documented 90% of the expected reptile and amphibian species. In addition, ANTI has a herp inventory in progress that should document 90% of the species present. CHOH has documented over 90% of the amphibian species expected in the park, but lacks complete information on reptiles. The subject expert, Joseph C. Mitchell, recommended that museum specimen searches and photos taken by park staff may bring this park's reptile list up to date. The seven remaining parks (CATO, GWMP, HAFE, MANA, MONO, ROCR, WOTR) will be surveyed for both reptiles and amphibians. A number of reptiles and amphibians have been identified as species of special concern in the region's national parks because they are rare or are likely to be used in vital signs monitoring. The steering committee decided that general inventories should take priority over obtaining detailed distribution and abundance data for species of special concern, therefore we will not obtain distribution and abundance data for these species at this time. Remaining information gaps on herp species of special concern will be pursued with other funding sources.

OBJECTIVES:

1. To complete population and verification of NPSpecies records for NCN reptiles and amphibians.

2. To complete searches of local natural history museums for herp records in NCN parks.

3. To conduct herp field surveys at CATO, CHOH, GWMP, HAFE, MANA, MONO, ROCR, and WOTR to bring the number of documented species up to at least 90% of the expected species in each park (Appendix B).

STUDY DESIGN AND METHODS:

Inventory methods for herps are described in detail in the study plan, Step 5, Survey Methods.

PARTNERSHIPS:

ANTI received funding in FY 99 to conduct a presence/absence survey of amphibians and reptiles in the park. The project will include an assessment of the status of herps in ANTI and development of management recommendations for ecological monitoring. In addition, PRWI and CHOH received funding in FY 00 from the Small Parks Initiative (SPIN). PRWI will conduct a survey for timber rattlesnakes in the park. Eleven sightings of the rattlesnake have occurred in the park since 1991, and research is needed in order to determine population size, denning sites, and distribution. PRWI will also

continue to monitor their amphibian populations and will transfer their amphibian data to a GIS data layer. CHOH will begin an amphibian monitoring program with SPIN funds.

IMPLEMENTATION:

This project will be carried out through a cooperative agreement with the U.S. Geological Survey, Biological Resources Division, Patuxent Wildlife Research Center, a university, or state agency. A request for proposals will be sent out by the end of November, 2000. A number of herpetologists at these institutions have already worked in some of our parks (Sam Droege – USGS, Robin Jung – USGS, Dr. Joseph Mitchell – University of Richmond, Dr. Ed Thompson - MD DNR, etc.), and would be excellent candidates to lead the study. We will coordinate and assist with the herpetologist's field work to ensure that the needs of the program are being met.

SCHEDULE:

FY 2001:

November	Prepare and submit a request for proposals for the herp inventories
October-February	Conduct searches of local museums for herp records in the region, edit and complete NPSpecies documentation for completed inventories in the park
November-March	Compile relevant GIS data layers (locations of water bodies, roads, etc.) for each park to be surveyed
January-March	Review submitted proposals, meet with potential principal investigators, and prepare cooperative agreement(s)
March-June	Hold meetings at each park to be surveyed including the principal investigators, park natural resource managers, and I&M staff, discuss sampling sites, conduct spring surveys (calling surveys, dipnet and minnow trap surveys, VES, turtle traps, coverboards, drift fence/pitfalls) at half of the parks with needed herp inventories
July-September	Conduct summer surveys (coverboards, dipnet and minnow trap surveys, road surveys, VES, turtle traps) at half of the parks with needed herp inventories

FY 2002:

October-December	Data analysis, 90% completion analyses, annual report preparation
January-February	Hold meetings at each park to be surveyed including the principal investigators, park natural resource managers, and I&M staff, discuss sampling sites
March-June	Conduct spring surveys (calling surveys, dipnet and minnow trap surveys, VES, turtle traps, coverboards, drift fence/pitfalls) at second half of the parks with needed herp inventories
July-September	Conduct summer surveys (coverboards, dipnet and minnow trap surveys, road surveys, VES, turtle traps) at second half of the parks with needed herp inventories
October-December	Data analysis, 90% completion analyses, annual report preparation

FY 2003:
Final report preparation and review; 90% completion analyses, follow-up field work needed to complete any remaining gaps

PRODUCTS:

A list of reptile and amphibian species documented in each park. A comparison will be made between the expected species (Appendix B) and documented species in each park. The principal investigator will provide annual reports, a final report, MS Access or Excel databases of all information collected during the project, and ArcView themes of project data. Metadata in accordance with FGDC and USGS NBII standards will be provided by the principal investigator. The Biological Inventories Coordinator will ensure that the project findings are entered into the appropriate I&M databases, including NPSpecies, NRBib, ANCS+, and the Dataset Catalog. The National Capital Network's Inventory & Monitoring Steering Committee and the Natural Resources Advisory Team (NAT) will be updated bimonthly.

FUNDING:

Budget Item	FY 2001	FY 2002	FY 2003	FY 2004
Cooperative Agreement	50,000	30,000		
Totals	**50,000**	**30,000**		

SECTION V: VASCULAR PLANTS

PROJECT TITLE: General Plant Inventories at National Capital Network Parks

PROBLEM STATEMENT:

The vascular plant subject experts are still reviewing some of our park species lists, therefore this section represents our best estimate of data gaps at this time. Although several parks (CHOH, GWMP, HAFE, MANA, NACE, and ROCR) have 90% or more of their vascular plants documented, all parks need at least some vascular plant inventory work. PRWI and WOTR have had little or no vascular plant inventories, and represent the network's highest priority parks for vascular plants. CATO has had a comprehensive inventory in 1977, but has not had any recent work done. ANTI and MONO have fairly complete species lists but need some additional inventory work to reach 90% documentation. In addition, all parks require inventories to address particular plant families for which the region is lacking information, such as the grasses (Poaceae), sedges (Cyperaceae), rushes (Juncaceae), and aquatic plants. In addition, CHOH and NACE need further inventory work because all the vascular plant inventories in these parks have been concentrated in particular park administrative units, with large parts of the parks having no vascular plant information. Although the steering committee decided that general inventories should take priority over obtaining detailed distribution and abundance data for species of special concern, we will obtain limited distribution and abundance data for these species as part of this project.

OBJECTIVES:

1. To complete population and verification of NPSpecies records for NCN vascular plants.

2. To complete searches of local natural history museums for vascular plant records in NCN parks.

3. To conduct vascular plant surveys at CATO, PRWI and WOTR to bring the number of documented species up to at least 90% of the expected species in each park (Appendix B).

4. To conduct vascular plant inventories at administrative units in CHOH and GWMP that have not been previously surveyed.

5. To collect distributional data on select families (grasses, sedges, rushes, and aquatic plants).

6. To map distribution patterns of species of special concern as they are encountered.

STUDY DESIGN AND METHODS:

All High and Medium Priority Parks will be inventoried between FY 2002 – 2004. We will prepare a request for proposals and select the most efficient study design that meets our needs. We expect that each park will be surveyed twice per season for a one year period to account for seasonal variation.

Randomly placed quadrats will be used to estimate species diversity and density in each park. Random sampling will be adjusted to increase the probability of selecting rare habitats such as riparian zones, rock outcrops, meadows, and other areas harboring rare plants. Species of special concern will be mapped as they are encountered within each park.
It is expected that 90% of the expected species will be documented. If the minimum threshold is not met after one year, inventories will continue until an adequate sample is reached.

Once inventories have been completed for High and Medium Priority Parks, the focus of the study will shift towards inventorying administrative units at CHOH and GWMP that have not been previously inventoried. Given the fragmented nature of the parks in the National Capital Network, some administrative units are likely to contain significant natural resources including species of special concern but have not yet been inventoried. In addition, focus will shift toward particular families and habitats that have not been inventoried previously. These include grasses, sedges, rushes, and aquatic plants.

IMPLEMENTATION:

This project will be carried out through a cooperative agreement with a university, state or federal agency. A request for proposals will be sent out in FY 2001. A number of botanists at these institutions have already worked in some of our parks and would be excellent candidates to lead the study. We will coordinate and assist with the botanist's field work to ensure that the needs of the program are being met.

SCHEDULE:

FY 2001

January-May	Conduct searches of local museums for vascular plant records in the region, edit and complete NPSpecies documentation for completed inventories in the park
May	Prepare and submit a request for proposals for the plant inventories

FY 2002:

October	Review submitted proposals, meet with potential principal investigators, and prepare cooperative agreement(s)
November	Initiate bimonthly visits to CATO, PRWI, and WOTR, enter new data into NPSpecies
September	Data analysis, 90% completion analyses, complete annual report

FY 2003:

October	Complete inventories initiated in FY 2002 and initiate inventories at select administrative units in CHOH and GWMP, enter new data into NPSpecies
September	Complete annual report

FY 2004

October Complete any remaining inventories, focus efforts on inventorying select vascular plant families (grasses, sedges, rushes, aquatic plants), map distributions for species of special concern, enter new data into NPSpecies

September Complete final report and generate maps of species of special concern

PRODUCTS:

A list of plant species documented in each park. The principal investigator will provide annual reports, a final report, MS Access or Excel databases of all information collected during the project, and ArcView themes of project data. Metadata in accordance with FGDC and USGS NBII standards will be provided by the principal investigator. The Biological Inventories Coordinator will ensure that the project findings are entered into the appropriate I&M databases, including NPSpecies, NRBib, ANCS+, and the Dataset Catalog. The National Capital Network's Inventory & Monitoring Steering Committee and the Natural Resources Advisory Team (NAT) will be updated bimonthly.

FUNDING:

Budget Item	FY 2001	FY2002	FY 2003	FY2004
Cooperative Agreement	35,000	35,000	60,000	
Totals	**35,000**	**35,000**	**60,000**	